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Title	Verb use in the early word combinations of children with and without specific language impairment
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Citation	
Issued Date	2003
URL	http://hdl.handle.net/10722/48833
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Verb use in the early word combinations of children with and without Specific Language Impairment

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A dissertation submitted in partial fulfilment of the requirements for the Bachelor of Science (Speech and Hearing Sciences), The University of Hong Kong, May 2, 2003.

Abstract

This study compared early word combinations in six Cantonese-speaking children with specific language impairment (CSLI) and six typically developing children matched by MLU. Their capacities for producing unique word combinations containing a syntactic relationship (UST), their use of verbs and verbal suffixes in USTs were examined in conversational samples. The two groups used a comparable percentage of USTs in their samples. Group differences in the percentage of USTs containing a verb (VST), and the percentage of different verb types used in their VSTs were not significant. Qualitative analysis revealed a trend that the CSLI children used more verb tokens but a less diverse set of verb types in their VSTs. The two groups also used comparable amount of verbal suffixes across similar number of verb types in their VSTs. Results were discussed in light of methodological issues, and further investigation of verbal syntactic utterances in CSLI children were indicated.

Introduction

Children with specific language impairment (SLI) are characterized by a significant limitation in language ability without accompanying hearing or cognitive impairment, neurological dysfunction, organic anomalies, or social-emotional disorders (Leonard, 1998). The linguistic characteristics of English-speaking children with SLI (ESLI) have been well studied, and these children showed limitations in almost every language domain relative to their age peers. Leonard summarized that, from a macro-linguistic point of view, ESLI tend to be more deficient in morphosyntax than semantics and pragmatics, with argument structure and phonology falling somewhat in between. From a micro-linguistic point of view, difficulties with verbs and verb-related grammatical morphemes are the hallmark features of the ESLI group.

Verbs and verb morphology in ESLI

Watkins, Rice and Moltz (1993) reported that the ESLI children used a less diverse verb lexicon than their language-matched (LM), as well as age-matched typically developing (AM) peers. However, like the other two groups of children, the ESLI children used a set of high frequency verbs similar to the set of *General All-Purpose* (GAP) verbs identified by Rice and Bode (1993). In a two-year longitudinal study of three ESLI children, Conti-Ramsden and Jones (1997) reported that the ESLI children had both a smaller and a less diverse verb lexicon than their LM peers. Nevertheless the ESLI children used a similar proportion of GAP verbs in their spontaneous speech as their LM peers.

In addition to limitations in their verb lexicon, Conti-Ramsden and Jones (1997) also found that the ESLI children used verb bare stems incorrectly more often than their LM peers, partly due to difficulties in using auxiliaries. Morphosyntax, especially grammatical morphemes relate to verbs, is an area that has been consistently identified as being problematic for the ESLI children (Leonard, 1998). For example, Leonard, Bortolini, Caselli, McGregor and Sabbadini (1992) reported that the ESLI children in their study produced a lower

percentage of grammatical morphemes (third-person singular, regular past inflections, copula and plurals) in obligatory contexts than the LM controls. Oetting and Horohov (1997) identified weakness of ESLI, when compared to AM and LM controls, in limited productivity of regular past-tense marking in obligatory contexts. They also reported that the ESLI children had a greater sensitivity to frequency manipulation, i.e. ESLI produced more errors with infrequently inflected verbs.

Rice and Wexler (1996) suggested that a set of morphemes (*-s*, *-ed*, *BE*, *DO*) that mark grammatical tense could be considered a clinical marker for SLI in preschool English-speaking children. This conclusion was evidenced by: (a) Low level of accuracy in the use of these target morphemes for the ESLI group relative to either the LM or the AM control groups, and (b) typically-developing children reached mastery of the target morphemes (above 90% in obligatory contexts) by age 5, while performance by the ESLI group at the same age was well below 50%. Bedore and Leonard (1998) showed, through the use of a discriminant function analysis, that a finite verb morpheme composite (regular past *-ed*, third-person singular *-s*, copula and auxiliary *be* forms) had considerable utility in distinguishing ESLI from their AM peers.

Word combinations of ESLI from preschool to school years

Studies of early word combinations actually point out that ESLI's weakness with verbs starts early on. Hadley (1998) examined the nature of early grammatical development longitudinally in young ESLI (19 to 31 months at identification) of two subtypes: children with expressive language impairment only, and children with both receptive and expressive language impairment. Despite a significant difference in the comprehension skills of the two ESLI subtypes, no obvious differences in early expressive grammatical development were observed. In both ESLI subtypes, verb phrase vulnerability was evident in verb-phrase structure expansion (absence of catenatives and auxiliaries) and protracted emergence of verb morphology.

Weakness with verbs starts early, and continues in the preschool period. There is increasing evidence which shows that this early verb phrase vulnerability extends into school years. School-age ESLI children were found to exhibit greater frequency and range of argument structure errors (King & Fletcher, 1993), deficits in complex resultative verb phrase constructions (Ingham, Fletcher, Schelletter & Sinka, 1998), and verb argument structure weakness (Thordardottir & Weismer, 2002).

Measures for early word combinations

In a study of early grammatical development, Hadley (1999) introduced a new measure, *unique syntactic types* (UST) as an alternative for use with young children at the stage of early word combinations. The UST was an index of the frequency of different early-word combinations that have a syntactic relationship, i.e. words belong to a grammatical word class that can participate in the syntactic relations of head, complement, or specifier. Hadley (1999) examined the relations between UST and two commonly measures of grammatical development, mean length of utterance (MLU) and total scores on the Index of Productive Syntax (IPSyn; Scarborough, 1990) over 9-month period in 20 ESLI toddlers between 19 and 31 month at the time of initial identification. The result showed that the number of USTs exhibited temporal reliability, and was highly correlated with the two measures of grammatical development at concurrent measurement points. As a measure of grammatical performance, the advantages of UST over MLU measure are that UST is not inflated by multiple productions of the same word combinations and is not confounded by the production of non-syntactic word combinations such as greetings and social words (Hadley, 1999).

Ingram, Kayser and Durfee (2002) extended the measure of UST to capture the grammatical performance in using verbs in a small group of Spanish-speaking children with SLI. They further introduced the measures of *verbal syntactic types* (VST), *verb types*, and *verb forms*. VSTs were USTs that contain a lexical verb; verb types were number of different verbs in VSTs; and verb forms were number of different bound morphemes used for a verb

type. They used these three measures to describe early verb acquisition of five Spanish-speaking children with SLI, whose MLU range from 1.7 to 2.2. Hypothetical stages of early verb acquisition were proposed according to the relationships and variations shown among the three variables. They concluded that these three variables could be potential measures for determining Spanish SLI children's level of verb acquisition.

Cantonese-speaking children with SLI (CSLI)

Studies of verbs and verb-related morphology in ESLI have highlighted the central role of verbs in early language development — they act as a bridge between meaning and sentence structure. To Chinese-speaking children, verbs may also be of particular significance. Tardif (1996) has shown that young children, learning Mandarin (which shares many linguistic features with Cantonese), produced more verbs than nouns in their natural conversational speech. Unlike English, there are no inflections (such as tense and agreement marking) for nouns and verbs in Cantonese. Instead, verb-related bound morphemes in the form of aspect markers and post-verbal particles are used to convey temporal meanings and signal finiteness in Cantonese (Stokes & Fletcher, 2003). Although these verb-related morphemes are not grammatically obligatory in Cantonese, their presence play an important role in specifying the meanings of the verbs, in terms of time, quantity and result. In spite of extensive studies of verbs and verb-related morphemes in ESLI, studies on CSLI are only beginning to emerge.

Stokes and Fletcher (2000) studied lexical diversity in a heterogeneous group of CSLI children with their MLU ranging from 1.4 to 3.4 words in their spontaneous conversation and story retelling. The number of utterances and the number of word tokens in the language samples were controlled for comparison of the lexical diversity of 15 CSLI children and 15 LM controls. The CSLI group was found to use a comparable frequency of verb tokens and verb types as the LM controls. However, the frequency of noun tokens and types were significantly higher for CSLI than the LM controls. Conversely, the frequency of closed class tokens (e.g. aspect marker, determiner, classifier, negative, verb particle, quantifier, pronoun)

was significantly lower for CSLI, mainly due to lower frequency of use of negation tokens. Although difference was not observed between the groups in the use of aspect markers, the CSLI children had a restricted distribution of the perfective aspect marker *zo2* compared to the LM controls. The CSLI children distributed this aspect marker across only half as many verbs as their LM peers. Two-thirds of the markers used by the CSLI children were fallen on just three verbs (*m4gin3* – lost; *dit3* – fall; *sik6* – eat) coding perfective aspect, whereas the LM controls used only one-third of the markers with these three verbs.

Wong, Stokes and Fletcher (in press) further studied the perfective aspect marker *zo2* in six CSLI with six LM children's 900-utterance conversational samples that were collected over six monthly visits to each child's home. The mean MLU for the CSLI group was comparable to that of the LM group, at 2.63 and 2.77 words respectively. No significant group differences were found in the token frequency of *zo2* or the distribution of *zo2* across verb types. The CSLI children, however, tended to restrict the use of *zo2* mainly with telic verbs, while the LM children extended its use with atelic verbs.

The use of aspect markers and post-verbal particles were also explored in another study by comparing 14 CSLI children with 14 AM controls (mean age of 53.5 and 52.7 months respectively) in conversation, a sentence repetition, and a video narration task (Stokes & Fletcher, 2003). No difference was found between the groups in their ability to encode the grammatical morphemes in the repetition task. In both the video task and conversation, the CSLI showed more limited facility in using aspectual forms, evidenced by fewer of the CSLI children used these forms than the AM controls. In addition, the AM controls used aspect markers with far more different verbs in the video task than the CSLI children.

To date, studies of CSLI focused mainly on lexical diversity and grammatical morphemes. Research on the use of verbs in CSLI's early word combinations was limited. Verbs and verb phrases in early word combinations was found to be especially vulnerable in ESLI (Hadley, 1998). The purpose of the present study was to compare early word combinations that have a

syntactic relationship and the use of verbs and verb-related bound forms in CSLI and a group of typically developing children that were matched on MLU (TD-MLU). Measures for early word combinations, i.e. UST, VST, verb type and verb form were adopted (Hadley, 1999; Ingram et al., 2002). The specific research questions of the study were as follows:

1. Do the CSLI children use the same percentage of USTs in their language samples as the TD-MLU children?
2. Do the CSLI children use the same percentage of VSTs in their USTs as the TD-MLU children?
3. Do the CSLI children use the same percentage of verb types in their VSTs as the TD-MLU children?
4. Do the CSLI children use verb forms and verb types that carried suffixes in a same ratio in their VSTs as the TD-MLU children?

Method

Subjects

Six CSLI children (CSLI 1 – CSLI 6), aged between 46 – 61 months, and six typically developing (TD) children (TD 1 – TD 6), aged between 24 – 33 months, were selected for this study. The CSLI subjects participated in three separate earlier studies on language impairment. CSLI 1 and CSLI 2 were subjects reported in Wong et al. (in press). CSLI 3 and CSLI 4 were subjects in a study of lexical diversity reported in Stokes and Fletcher (2000). CSLI 5 and CSLI 6 were subjects in a project on grammatical morphology in CSLI that is in progress. Inclusion criterion for the six CSLI children was performance at least 1.5 standard deviations below the mean on the Expressive section of Reynell Developmental Language Scale (RDLS: Reynell & Huntley, 1985; Cantonese version, 1987). Five of these CSLI children also scored at least 1.5 standard deviations below the mean on the Receptive section of RDLS. These

children also had to meet the conventional criteria for SLI of no physical, socio-emotional or cognitive impairments, as reported, and they all passed a hearing screening.

The six younger TD children, who served as controls for the CSLI group, were selected from a database of eight children participating in a longitudinal study of language development (Lee et al., 1996). All these children came from Cantonese-speaking families. No formal language assessment was given to these children and there were no reports or concerns on their language or overall development. A detailed description of these children was provided by Lee (1996).

Language samples for both groups were collected during free play with investigators or family members. The samples were collected at either the child's home or at the Child Language Laboratory of the University of Hong Kong. A majority of language samples selected for this analysis were samples of spontaneous conversation. For one of the CSLI children, and two of the TD children, a story retelling and a storybook reading samples were used respectively. All of the language samples used in this study were transcribed according to the Cantonese romanization scheme of the Linguistic Society of Hong Kong (Matthew & Yip, 1994, pp.400-401) and entered into CHAT format (MacWhinney, 2000).

Group matching of subjects by MLU

As this study was to examine early word combinations, subjects were selected when their language level was around MLU 2.0 to 3.0 words. MLU around 2.0 was regarded as an indication of the early word combination stage in English (Hadley, 1999). In this study, children with MLU between 2.0 to 3.0 words were examined instead, taking into account of the nature of Cantonese. Cantonese is a language rich in sentence-final particles (SFPs), which indicate speech-act, affective and emotional colouring (Matthews & Yip, 1994). SFPs were used frequently in children as young as two years of age, and hence inflating their MLU value.

The two groups of children were matched by their mean MLU, based on an alternate MLU calculation procedure. Since the CSLI subjects in this study were selected from three

different databases, a high variability of discourse and situational effects were observed, e.g. different communication style of investigators and family members, language samples collected at home versus those collected at the language laboratory. To improve validity of matching language levels between the two groups of children, Johnston (2001) suggested an alternate MLU calculation procedure by removing those utterances most reflective of discourse effects, such as single word yes/no responses and elliptical answers to close-end questions. The following utterance exclusion criteria were adopted for the purpose of MLU calculation in this study:

- Utterances excluded by default in the CLAN program (retracing within the utterance, unintelligible and partially unintelligible utterances marked as xxx and yyy in the transcript).
- Incomplete utterances and immediate self-repetitions of the child.
- Utterances which contain only discourse markers: fillers (e.g. *e6, um1*) and exclamations (e.g. *waa3*).
- Utterances that are not generated by underlying linguistic rules: recitation from rhymes, commercials, songs etc.; list of numbers or objects; and symbolic noise that does not form a syntactic relationship with other sentence elements.
- Utterances which are likely to reflect discourse biases (Johnston, 2001), i.e. responses to those questions that require basically one sentence constituent as an adequate response. For Cantonese, these include responses to the following questions:
    - A-not-A questions (e.g. *hou2 m4 hou2?* – good not good?, response: *hou2/m4 hou2*).
    - Yes-no questions (e.g. *jau5 mou5 aa3?* – have not-have SFP?, response: *jau5/mou5*).
    - Yes-no questions ended with a SFP "*aa4*" or "*gaa4*" and a falling intonation (e.g. *caai2 daan1ce1 aa4?* – ride bicycle SFP? or *nei5 waak3 gaa4?* – you draw SFP?, response: *hai6/m4 hai6*).

- Questions ended with *mei6*+SFP (e.g. *sik6 zo2 mei6 aa3?* – eat ASP not-yet SFP?, response: *mei6/sik6 zo2*).
- Wh-questions which typically require a response that contains one sentence constituent (e.g. *jau5 me1 aa3?* – has what SFP?, response: *zyu1* – pig).

Table 1. Sex, age, RDLS-Expressive standard deviation score, sample length and MLU for the CSLI and TD-MLU group

Subject	Sex	Age	Deviation from the mean on the RDLS-Expressive	Corpus length (no. of utterance)	MLU
CSLI 1	M	47	-2.6	90	2.83
CSLI 2	M	61	-1.5	68	2.18
CSLI 3	M	46	-3.3	100	2.36
CSLI 4	M	59	-1.7	72	2.60
CSLI 5	F	57	-2.2	100	2.80
CSLI 6	M	60	-1.7	100	2.51
Mean (*SD*)		55 (6.7)			2.55 (0.25)
TD 1	M	30	n/a	100	2.72
TD 2	F	24	n/a	100	2.45
TD 3	M	30	n/a	100	2.89
TD 4	F	33	n/a	100	2.87
TD 5	F	26	n/a	100	2.48
TD 6	M	27	n/a	100	2.94
Mean (*SD*)		28 (3.3)			2.73 (0.22)

Note: *SD* = Standard deviations; n/a = not available

After the exclusion, six CSLI samples with MLU ranging from 2.0-3.0 words were available and matched with six TD samples on mean MLU (TD-MLU). Table 1 shows each child's age, RDLS-Expressive standard deviation score, sample length and MLU by group. The original language samples of the two groups varied considerably in length. The TD group's samples were much longer, ranging from 240 to 684 utterances, while CSLI group's samples ranged from 113 to 151 utterances in length. Initially, MLU calculation and analysis for this study were intended for the first 100 utterances after exclusion. However, as it turned

out, only 68 to 90 utterances remained for three CSLI subjects after the utterance exclusion criteria were applied (see Table 1). The mean MLU for the CSLI group was 2.55 words, while that of the TD-MLU group was 2.73 words. However, this group difference was not statistically significant in a one-way ANOVA, $F(1,10) = 1.74$, $p > 0.10$. As a result of the language match, children in the CSLI group were on average two years older than those in the TD-MLU group (55 vs. 28 months respectively).

Coding and scoring procedures

In this study, UST was adopted as a measure of children's capacity for producing syntactic word combinations (Hadley, 1999). VST was a measure of their capacity for using verbs in syntactic utterances. Verb type measures the diversity of verbs used in VSTs. Verb form and verb type that carry suffixes (VF' and VT' respectively) were measures for the variety of verb suffixes used across different verb types. The number of USTs, VSTs, verb types, VF' and VT' was tallied for each sample according to the following definitions.

Unique syntactic type (UST) — According to Hadley (1999), a UST is "operationally defined as a unique combination of two or more words with syntactic status that could fit into the phrase structure of a more grammatically complete adult utterance" (p.263). An utterance was considered as "unique" from other utterances if different words were used in the combinations (e.g. *sik6 syut3gou1* – eat icecream; *sik6 syu4tiu2* – eat fries) or when variations in grammatical morphology were noted (e.g. *sik6 syut3gou1* – eat icecream; *sik6 zo2 syut3gou1* – eat ASP icecream). A word was regarded as having "syntactic status" if it belongs to a grammatical word class that participates in the syntactic relations of head, complement, or specifier. Hence, these words or expressions were not considered as having a syntactic status:

- Discourse markers: fillers (e.g. *e6, um1*), exclamations (e.g. *waa3*).
- Greetings (e.g. *zou2san4* – good morning), social words (e.g. *do1ze6* – thank you).
- Nouns used to address the listener (e.g. "*maa1maa1*" in "*maa1maa1, zau2*" – mother, go).

- Markers of affirmation or negation that occur on their own (e.g. "*hou2*" in "*hou2, ngo5dei6 zau2*" – good, we go).
- Formulaic expressions marked as unanalysed productions during the original transcription process (e.g. "*sau3*" in "*sik6 sau3* [:xx] *wo4*" – eat xx SFP).
- Sentence-final particles (SFPs) (e.g. "*aa3*" in "*syut3goul aa3*" – icecream SFP; "*lei4 gaa3*" in "*sing1sing1 lei4 gaa3*" – star SFP SFP).

To account for irregular corpus length, the number of USTs was expressed as a percentage of utterances included for each child's MLU calculation (UST%).

Verbal syntactic type (VST) — A VST is a UST that contains a verb from any of the four types to be specified below. Since the number of USTs was not controlled, the number of VSTs was expressed as a percentage of the total number of USTs (VST%). As is clear from its definition, the raw number of VSTs also represents the number of verb tokens used in the USTs.

Verb type (VT) — measures the number of different main verbs used in the VSTs. Four verb types were identified in this analysis: lexical verbs, function verbs, verbal compounds, and serial verb constructions.

Lexical verbs include activity verbs (e.g. *waan2* – play), stative verbs (e.g. *zung1ji3* – like), verbs of perception (e.g. *tai2* – look), verbs of cognition (e.g. *zi1dou3* – know), verbs of posture (e.g. *co5* – sit) when occur on their own.

Function verbs are restricted to copular verb "*hai6*" (be), coverb "*hai2*" (at), existential verb "*jau5*" (have) and its negative counterpart "*mou5*" (not-have) when occur on their own.

Verbal compounds here referred to the following subtypes: (a) Resultative verb compounds (RVCs) — two-element verb compound with "the second element signals some result of the action or process conveyed by the first element" (Li & Thompson, 1981: p.54), e.g. *zing2 laan6* (make broken), *sik6 jyun4* (eat finish), *naau6 sei2* (scold die); (b) Directional

RVCs (DRVCs) — a RVC with a displacement verb as the first element and directional verb (which may itself be a compound) as the second element. A DRVC "signals the direction in which the subject moves as a result of the displacement" (Li & Thompson, 1981: p.58), e.g. *dit3 lok6 lei4* (fall down come), *baai2 soeng5 heoi3* (put up go), *ceot1 lei4* (out come); (c) Verb-object compound — two constituents having the syntactic relation of a verb and its direct object with resulting meaning often not fully reflects that of the object (Li & Thompson, 1981 & Matthews & Yip, 1994), e.g. *heoi3 gaai1* (go street = go out), *jau4 seoi2* (swim water = swim).

Serial verb constructions (SVCs), according to Li & Thompson (1981: p.594), contain two or more verb phrases or clauses juxtaposed without any marker indicating the relationship between them, e.g. *bei2 baa4baa4 sik6 ping4gwo2* (give father eat apple). Coverbs, which typically occur together with another verb, are considered to be a SVC (Matthews & Yip, 1994), e.g. *bong1 keoi5 zeok3 haai4* (help him wear shoe).

Modal verbs were not considered main verbs in this analysis since they often precede a main verb and do not form a syntactic relationship with other elements (e.g. noun) on their own. Also, they are not used frequently and productively in Cantonese-speaking children's early word combinations. Verbal compounds or SVCs were each counted as one verb type instead of by its number of constituent verbs, in order to give credit to the child's knowledge of using the compound as a whole. Again, since the number of VSTs was not controlled, the number of verb types was expressed as a percentage of the total number of VSTs (VT%).

The raw number of VTs measures the number of different verbs used in VSTs, and as stated earlier, the raw number of VSTs represents the number of verb tokens used in the USTs. Hence, VT% is similar to a type-token ratio (TTR) that measure lexical diversity in a lexicon. The only difference is that VT% denotes the diversity of verbs used in unique syntactic utterances, but excludes verbs in non-syntactic utterances.

Verb form (VF') and verb type (VT') that carry a suffix — VT' measures the number of verb types that were used with a suffix. VF' measures the number of different forms (bare verb or with suffix) used with the VT'. To illustrate, a verb, when followed by a suffix in a VST, was considered a VT' and VF', e.g. *maai5 zo2 syut3gou1* (buy ASP-perf. icecream). The same verb "*maai5*" (buy) when used in its bare form in a different VST (*maai5 syut3gou1* – buy icecream) was considered another VF'. So for the verb "*maai5*" (buy), it was counted as one VT' and two VF' (i.e. *maai5*; *maai5 zo2*). Take for another example, a child produced the following VSTs: *sik6 zo2 syut3gou1* (eat ASP-perf. icecream), *sik6 gan2 syut3gou1* (eat ASP-cont. icecream), *zyu2 joeng4cung1* (cook onion), and *zyu2 zo2 laa3* (cook ASP-perf. SFP). Then, his VT' was two (i.e. *sik6*; *zyu2*) and VF' was four (i.e. *sik6 zo2*; *sik6 gan2*; *zyu2*; *zyu2 zo2*). Repeated use of a particular suffix with the same verb type in different VSTs was not scored for an extra VF' or VT', e.g. in utterances *zaa1 zyu6* (hold ASP-cont), *zaa1 zyu6 bo1bo1* (hold ASP-cont ball), and *maa1mi4 zaa1 zyu6* (mummy hold ASP-cont), only one VT' (*zaa1* – hold) and one VF' (*zaa1 zyu6*) were counted. Since the number of VSTs was not controlled, a ratio of VF'/VT' was computed for each child. This ratio has a minimal value of one. A ratio greater than one indicates, on average, more than one verb form was used for a verb type. For example, a ratio of two implies that two verb forms were used, for one verb type, in any of the following combinations: (a) one bare form (e.g. *sik6* – eat) + one suffix (*sik6 zo2* – eat ASP-perf.), or (b) two different suffixes (e.g. *sik6 zo2* – eat ASP-perf. and *sik6 gan2* – eat ASP-cont.).

According to Lee, Wong, Si, Mak & Chan (1995), suffixes (see Table 2) are mutually exclusive, and are bounded only to verbs and verbal compounds, but not phrases. They also do not allow any elements to intervene between them. Verbal particles that are bound to words, as well as phrases and sentences, were not analysed as a verb form in this study. Since, when it modifies a phrase or a sentence, it is difficult to isolate the corresponding verb type to which the particle is bounded. Moreover, some of them can occur after a suffix (Lee et al., 1995).

Table 2. Common suffixes in Cantonese (Lee et al., 1995)

Form	Meaning	Examples
	Aspectual suffixes (or aspect markers)	
zo2	- Perfective	*sik6 zo2 syut3gou1*— eat ASP-perf. icecream
gan2	- Progressive	*gong2 gan2 tin6waa2*— talk ASP-prog. telephone
Zyu6	- Continuous	*zaa1 zyu6 seoi2hau4*— hold ASP-cont. hose
gwo3	- Experiential	*heoi3 gwo3 nei1dou6*— go ASP-exp. here
Hoi1	- Habitual	*sik6 hoi1 nei1 zek6 joek6*— eat ASP-hab. this CL drug
haa5	- Delimitive	*sai2 haa5 zek3 dip2*— wash ASP-del. CL plate
maai4	Scope suffix	*sik6 maai4 go2 caang2*— eat SUF-scope CL orange
gwo3	Resumptive suffix	*zoi3 waan2 gwo3*— again play SUF-resumptive
saai3	Degree suffix	*fuk6 saai3 nei5*— respect SUF-degree you
dak1	Modal suffix	*sik6 dak1 gaa3*— eat SUF-modal SFP
can1	Resultative suffix	*nei5 haak3 can1 ngo5*— you scare SUF-resultative me

Summary — In sum, the variables in this study include: UST%, VST%, VT% and VF'/VT' ratio. Data from the child CSLI 1 were used here to illustrate how his scores for these variables were obtained. Table 3 illustrates all the scores of interest in this study for the child CSLI 1. This child produced 54 utterances that have a syntactic relationship of some kind (UST token), which accounted for 60% (UST%) of the 90 utterances used for his MLU calculation. Among the 54 UST tokens, 48 of them contained a verb (VST token), i.e. his VST% was 89%. The child used 24 different verb types (VT token) in his 48 VST tokens, i.e. his VT% was 50%. Four verb types were modified by suffixes (VT'), which summed up to a total of eight verb forms (VF'), and hence the VF'/VT' ratio was 2.0.

Table 3. Scores of UST, VST, VT, VF' and VT' for the child CSLI 1

UST		VST		VT		VF'	VT'	VF'/VT'
token	%	token	%	token	%	token	token	ratio
54	60%	48	89%	24	50%	8	4	2.0

Reliability

One language sample was randomly selected for reliability check from each of the two groups, which account for 17% of the total samples. A final year BSc. student from the Division of Speech and Hearing Sciences was trained to identify UST, VST, VT, VF' and VT'. Reliability for each of the scores was over 93% for the CSLI sample and over 96% for the TD-MLU sample.

Results

The mean UST%, VST%, VT%, and their standard deviations for the CSLI and TD-MLU group are shown in Table 4.

Table 4. The mean UST%, VST%, and VT% (and standard deviations) scores for the CSLI and TD-MLU group

	UST%	VST%	VT%
CSLI	60% (4.1)	81% (8.5)	58% (11.5)
TD-MLU	59% (7.2)	76% (9.0)	67% (6.7)

Unique syntactic types

Table 4 shows that the CSLI group and the TD-MLU group had almost identical mean UST%, 60% versus 59% respectively. Obviously, no significant difference between the two groups was found in a one-way ANOVA, group (2) by UST% ($F(1,10) = 0.05, p > 0.10$). The variability of the UST % in the TD-MLU group ($SD = 7.2\%$) was slightly larger than that in the CSLI group ($SD = 4.1\%$). The CSLI children used a comparable percentage of word combinations that have a syntactic relationship in their utterances as the TD-MLU controls.

Verbal syntactic types

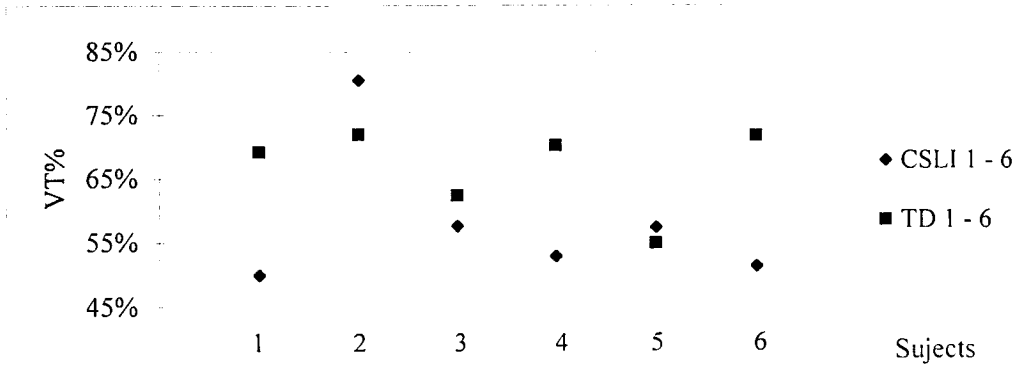
As is clear from Table 4, among the USTs, the CSLI group used a higher VST% than the TD-MLU group, 81% and 76% respectively. However, a one-way ANOVA, group (2) by VST% did not find this difference statistically significant ($F(1,10) = 0.96, p > 0.10$). VST%

values in the CSLI group ranged from 67% to 90%, while they ranged from 58% to 83% in the TD-MLU group, within group variability was high, 8.5% versus 9.0% respectively. Though not statistically significant, the CSLI group seemed to have a higher percentage of their USTs that contain a verb than the TD-MLU group.

Verb types

Table 1 shows that the CSLI group used a lower VT% than the TD-MLU group, 58% versus 67% respectively. However this difference did not reach statistical significance using a one-way ANOVA, group (2) by VT% ($F(1,10) = 2.37, p > 0.10$). Within group variability for VT% was observably larger in the CSLI group ($SD = 11.5\%$) than that in the TD-MLU group ($SD = 6.7\%$). Two outliers were identified from the two groups. Outliers were defined as 1.5 standard deviations either above or below their respective group means. Figure 1 shows the VT% value for each child by group. Subject CSLI 2 scored 81% for VT%, while the other five children in the CSLI group scored less than 60%. On the other hand, subject TD 5 scored 55% for VT%, whereas all the other members scored above 60%. The trend was more apparent in a larger difference between the median scores of VT% for the CSLI group and the TD-MLU group, 55% and 70% respectively. These analyses showed that although not statistically significant, the CSLI group seemed to use a less diverse set of verbs in the VSTs than the TD-MLU group.

Figure 1. VT% for each child in the CSLI and TD-MLU group



Verb forms and verb types followed by suffixes

Table 5 shows the mean and standard deviation of the VF', VT' and the VF'/VT' ratio for the two groups of children. The CSLI group had a slightly higher VF'/VT' ratio than the TD-MLU group, 1.42 and 1.36 respectively, with similar within group variability. No significant difference was found in a one-way ANOVA, group (2) by VF'/VT' ratio ($F(1,10) = 0.06, p > 0.10$). Most of the children in both groups used more than two verb forms (one bare form and one form followed by a suffix) for one verb type. Only one child (CSLI 1) used three different verb forms with one of the verb types followed by suffixes, i.e. *sik6* (eat), *sik6 zo2* (eat ASP-perf.) and *sik6 dak1* (eat SUF-modal). The analysis showed that the CSLI children used a comparable number of verb forms for those verb types followed by suffixes in their VSTs as the TD-MLU controls.

Table 5. The mean VF', VT' and VF'/VT' ratio (and standard deviations) for the CSLI and TD-MLU group

	VF' (token)	VT' (token)	VF'/VT' ratio
CSLI	4.17 (2.32)	2.83 (0.98)	1.42 (0.38)
TD-MLU	5.33 (3.88)	3.83 (2.71)	1.36 (0.40)

In summary, the two groups of children used similar percentage of word combinations that have a syntactic relationship in their utterances. However, the CSLI group seemed to have a higher percentage of their USTs that contain a verb, but use a less diverse set of verbs in the VSTs than the TD-MLU group. The CSLI children used a comparable number of verb forms for those verb types followed by suffixes in the VSTs as the TD-MLU controls.

Discussion

This was a preliminary study examining early word combinations in a small group of CSLI and TD-MLU children. Their capacities for combining words that have a syntactic relationship and using verbs in these utterances were measured by UST%, VST% and VT%.

Their use of morphological suffixes after verbs were also explored, using the ratio of VF'/VT'. Although group differences identified in this study were not statistically significant, these differences certainly point to trends that were worth further exploration. These trends will be further discussed here, to be followed by a general discussion of methodological issues that relevant to the interpretation of these findings.

Capacity for producing unique syntactic utterances

No significant difference was found in two groups' UST%. About 60% of their utterances have a syntactic relationship between the words. This result was within expectation given Hadley's (1999) work on ESLI that UST was highly correlated with MLU. Since the two groups of children in this study were matched by MLU, their ability to combine words with syntactic relationships was therefore likely to be similar. Results from this study indicate that the CSLI children have a similar capacity for producing utterances with unique syntactic relations as typically developing children at the same level of language development indexed by MLU between 2 – 3 words.

Capacity for producing syntactic utterances with verbs

When VST% (the percentage of USTs that contains a verb) was considered, the CSLI group form more of these unique syntactic utterances with a verb. About 80% of the unique syntactic utterances produced by the CSLI group contain a verb, while their TD-MLU peers used a verb in about 75% of their unique syntactic utterances. Therefore, the CSLI children seemed to show better deployment of verbs in their utterances to form syntactic relationships than their younger TD-MLU controls.

The composition of VSTs was further examined focusing on the percentage of function verbs in each child's VST tokens. Function verbs were specifically examined since they are a limited set with only four members. Repeated use of these verbs in the VSTs could imply a more limited deployment of other relatively open set of verbs, i.e. lexical verbs, verbal compounds and SVCs. Results showed that the CSLI children used function verbs in 17% -

29% of their VSTs (median = 22%), except for the child CSLI 2, who used function verbs in only 8% of his VSTs. Conversely, the TD-MLU children used function verbs in 8% - 19% of their VSTs (median = 12%), except for the child TD 5, who used function verbs in 43% of her VSTs. The CSLI group seemed to use more function verbs in their VSTs than the TD-MLU group. A possible reason for this heavier reliance on a small set of function verbs could be due to frequent input from adult's speech to these children during interactions (Rice & Bode, 1993). Function verbs are frequently used in adult's questions, such as A-not-A question (*hai6 m4 hai6*? – is not is?), yes-no question (*jau5 mou5*...? – have not-have...?), Wh-question (*jau5 me1 aa3*? – has what SFP?; *hai2 bin1dou6?* – at where?).

Function verbs have a less specific semantic meaning and do not take as an extensive a set of suffixes as other three categories of verb types. For example, the verbs *jau5* (have), *mou5* (not-have), and *hai2* (at) can be modified by at most two suffixes (*zo2* and *saai3*). A heavier reliance on function verbs in VSTs by the CSLI group may possibly indicate vulnerability in verb-phrase-structure expansion as suggested by Hadley (1998).

Diversity of verb use in verbal syntactic utterances

Group differences in VT% showed that the CSLI children used a less diverse set of verbs than the TD-MLU children to produce VSTs. This finding parallels that of Watkins et al. (1993), who also reported a less diverse verb lexicon for ESLI children than their LM peers. Their study suggested that the ESLI group produced a similar number of different verbs but a larger number of verb tokens, and hence a lower verb TTRs than their LM peers. The CSLI group in this study showed a higher proportion of verb tokens (VST%) and a lower diversity (VT%) in their VSTs than the TD-MLU group. The diversity measure in this study (VT%) represents a different aspect of verb diversity than that in Watkins et al.'s study (verb TTR), while the findings were similar. Even in USTs (which exclude non-syntactic utterances and repetitions of syntactic utterance), the CSLI children still used a less diverse set of verbs than their TD-MLU peers. As suggested by Watkins et al., these children were possibly working

with a restricted set of verb resources, and repeating the use of these verbs in their word combinations. For example, four children in the CSLI group repeatedly used one lexical verb in five to ten VSTs, while none of the TD-MLU children repeated a lexical verb in more than four VSTs.

Interesting, though, is the presence of exceptions from the above trend in both groups of children. Subject CSLI 2 showed a much higher diversity measure (VT%) than the other group members (as in Figure 1). This child used a comparable number of verb types with few repeated use in his VSTs. Apparently, he achieved this high verb diversity at the expense of shorter utterance length (shown by the lowest MLU in the group). Detail inspection of his language sample revealed that 90% of his VSTs were 2-element VO structure, and the other 10% were simple SVO structure, using mainly bare nouns as the direct object. It is possible that CSLI 2, at the age of five years, had knowledge of a variety of verbs but a limitation in deploying these verbs in different types of syntactic utterances (Stokes & Fletcher, 2000). Hence, this child seems to have difficulty with using verb argument structure, rather than limitation in verb diversity. Contextual influence should be considered in analysis of verb use of this sort in a child like CSLI 2. He used 11 VSTs (8 lexical verbs) to describe actions related to cars that he played with. It was not known whether this high verb diversity was consistent across other contexts, especially contexts he was less familiar with. Another confounding factor for his high verb diversity could be the corpus length. The corpus length of this sample was the shortest among all children (Table 1). Watkins et al. (1993) pointed out that the diversity measure of TTR (VT% in this study) was sensitive to sample size variations, since words tend to be repeated more often in longer language samples, and thus lower TTR ratio.

Alternatively, subject TD 5 had a considerably lower VT% than the other group members (Figure 1). This low verb diversity was mainly due to much higher-than-average use of function verbs in her VSTs. This exception was not observed when the effect of function verbs

was removed from the diversity measure — her VT% was 78% if function verbs were removed from her VT and VST tokens. The most frequently used function verb by this child was *hai6* (be), and mainly used in A-not-A question, e.g. *hou2 geng1 hai6 m4 hai6?* (very afraid is-not-is?). The low verb diversity exhibited by this child may be due to a lack of knowledge of lexical verbs which led to heavy reliance on function verbs with non-specific semantic meaning. Her high-frequency use of function verbs could also be due to frequent input of these verbs in adult's speech as discussed in previous section.

Use of verbal suffixes

Group means of VF'/VT' ratio showed that the CSLI group used a comparable number of verb forms for those verb types followed by suffixes in the VSTs as the TD-MLU group. The CSLI children appeared to use verbal suffixes in their syntactic utterances in a similar way as the TD-MLU group. Both groups have VF'/VT' ratios ranged from 1.0 to 2.0. A closer examination of each sample revealed that the children used suffixes in one of the following combinations: (a) they used suffixes after different verb types, e.g. *dit3 zo2* (fall ASP-perf.), *m4gin3 zo2* (lost ASP-perf.) and *zaa1 zyu6* (hold ASP-cont.), without using any bare forms of those verb types (VF'/VT' ratio = 1.0); (b) they used suffixes after different verb types, e.g. *sai2 haa5 dip2* (wash ASP-del. plate) and *hoi1 zo2* (open ASP-perf.), and also used the bare form for some of the verb types, e.g. *sai2 bui1* (wash cup) (VF'/VT' ratio ranged from 1.0 – 2.0); (c) they used suffixes after different verb types and also used the bare form for each of the verb types (VF'/VT' ratio = 2.0). The combinations (a) and (b) were more frequently used by both groups. All the children used the same suffix with different verb types or different suffixes with different verb types. None of them used different suffixes with one verb type, except subject CSLI 1, who used two suffixes (perfective aspectual and modal suffixes) after one verb type (*sik6* – eat). Therefore, at this early stage of word combinations, both groups of children were using a suffix across different verb types in their VSTs, as indicated by a VF'/VT' ratio approaching to 1.0, but did not use different types of suffixes to modify one

verb type. As children use more different suffixes to modify one verb type, the VF'/VT' ratio increases due to a larger increase in VF' than in VT'.

The CSLI group did not show more restricted use of suffixes than the TD-MLU group, as that observed in the study by Stokes & Fletcher (2000). This could be due to the fact that this study used only a small group of subjects, a shorter language sample from the children, and a more homogeneous but less linguistically advanced group of CSLI children.

Interpretation of results in light of methodological issues

Definitions of verbs and suffixes— Comparison of results from this study with that reported in previous studies (e.g. Stokes & Fletcher, 2000 & 2003) should take into account of different definition of verbs, especially verbal compounds and suffixes. Verbal suffixes included those morphemes bound to words only, but not phrases or sentences. The repertoire of suffixes, described by Lee et al. (1995) comprises some words that were previously regarded as "post-verbal particles", e.g. the resultative suffix *can1*, scope suffix *maai4*, degree suffix *saai3*, or clitic e.g. modal suffix *dak1*, following Matthews and Yip (1994). Some bound forms can function as both suffix and particle, e.g. *zyu6* can be the continuous aspectual suffix or aspectual particle, depends on whether it modifies the verb or the predicate phrase. The definition of suffixes in this study also included forms that were not examined in earlier studies (Stokes & Fletcher, 2003), such as modal suffix *dak1*.

In addition, under the definitions of RVC in Li & Thompson (1981), some bound forms previously regarded as "post-verbal particles" are regarded as the second element of a RVC, e.g. "*jyun4*" in "*sik6 jyun4*" (eat finish), "*dou2*" in "gin3 dou2" (see achievement-RVC). This affects two measures of VT% and VF'/VT' ratio in this study. Since RVC as a whole was counted as one verb type, the number of verb types increased, and hence the diversity measure VT%. The RVC will be included in VF' only when it is followed by a suffix, hence, the frequency of VF' was lower than if the second element of RVC was regarded as a suffix, which would result in a lower VF'/VT' ratio. For example, the child CSLI 5 produced "*cyun1*

gwo3" (through over), "*cyun1 faan1*" (through phase-RVC), "*cyun1 dou2*" (through achievement-RVC), and "*cyun1 jap6*" (through in). Although all these RVCs pivot on the verb "*cyun1*" (through), they were counted as four verb types instead of one in the calculation of VT%. Also, they were included in VF' and VT' only when they were followed by a suffix, e.g. "*cyun1 jap6 zo2*" (through in ASP-perf.). Therefore, frequent use of RVCs by a child was accounted for by an increase in verb types rather than in verb forms (unless when a suffix was used after the RVC), or an increase in diversity as measured by VT% (or TTR). Similarly, the same consequence was seen when DRVC and SVC were counted as one unique verb type. For examples, the DRVCs *dit3 lok6 lei4* (fall down come) and *dit3 lok6 heoi3* (fall down go) were counted as two verb types with one token for each, instead of four verb types and six tokens; the SVCs "*heoi3 hoi1 mun4*" (go open door) and "*heoi3 tai2 dang1sik1*" (go watch lightings) were tallied with two verb types and tokens instead of three verb types and four tokens.

Age differences—When matching children's language ability with MLU, age differences between the SLI group and the language-matched controls could be a confounding factor for insignificant group findings on some variables. In this study, the CSLI group was, on average, 27 months older than their younger language-matched peers. This large age gap probably constitutes large developmental difference in world knowledge and language experience, and which in turn may have considerable impact on language ability, such as lexical diversity (Owen & Leonard, 2002). The CSLI children, being older, probably have cognitive resources that are unavailable to, or under deployed by the younger control groups, even though they have language impairment (Ingham et. al, 1998). This age difference could explain partly the performance of the two outliers identified in the computation of diversity measure. It was possible that child CSLI 2, the oldest in the CSLI group, had better knowledge of verbs (reflected by a large number of verb types used), but showed limitations in using these verb lexicon (reflected by low VST tokens) in syntactic utterances. Child TD 5, however, being three years younger lack both the knowledge of verbs and the cognitive resources to deploy

their use in conversation (reflected by both low verb type and VST tokens for verbs other than function verbs).

Matching by MLU—Computation of MLU is another important factor to be considered in the matching of linguistic ability among children, Cantonese-speaking children in particular. MLU-morpheme based on rules specified by Brown (1973) was the most widely acceptable measure as a general index of grammatical development. Nevertheless, its reliability and validity had been criticized (Klee & Fitzgerald, 1985), as it had been shown that the child's MLU is contextually dependent. Johnston, Miller, Curtiss & Tallal (1993) found that in a standard interview protocol, 50% of children's replies to questions were elliptical responses. As questioning increased, children with SLI showed an increased likelihood to used more ellipsis, more so than the typically developing children. Therefore resulting in a differential distortion in MLU values. In view of this unfavourable effect of contextual bias, single element responses to questions that provided only one queried constituent were excluded in this study to eliminate discourse bias and allow better reflection of the length of truly grammatical utterances (Klee & Fitzerald, 1985, Johnston, 2001). By adopting this more stringent criterion, it was found that the length of the samples was significantly reduced for both the CSLI and younger TD children. As a consequence their MLUs increased. For example, two-thirds of a 160-utterance language sample of a CSLI child was excluded due to a high proportion of single-word responses to close-end questions. During the process of sample selection, half of the samples from the CSLI databases could not be used for analysis due to inadequate utterance length or higher MLU than 3.0 words after exclusion. This effect of questioning was not limited to CSLI children, since in half of the samples selected for the TD-MLU group, 50% of the utterances had to be excluded based on our criteria. However, different consequences of adult questioning was observed between CSLI children and the younger TD children. For example, the language samples of children CSLI 2 and TD 5 consisted of a high proportion of single-word responses to questions, 53 utterances for CSLI 2

and 49 utterances for TD 5. Child CSLI 2 tended to provide a simple elliptical answer. However, in addition to providing an elliptical answer, child TD 5 also asked a lot of A-not-A questions in her spontaneous utterances. This could be due to high proportion of A-not-A questions in the adult utterances (about 40% of adult's questions were A-not-A). Such frequent input from adult utterances might trigger a frequent use of function verbs in child TD 5 (Rice & Bode, 1993).

Given the adverse effect of close-end questions on both CSLI children and younger typically developing children, clinicians or researchers need to be cautious of their discourse style when interacting with a child for the purpose of collecting a representative language sample. In order to collect language samples that reflect a child's actual language performance, close-end questions that lead to elliptical responses should be kept minimal, especially with children with language impairment.

Conclusions

Findings from the present study indicate that, at the same level of language development, children with CSLI have the ability to combine words that contain some sort of syntactic relationships similar to typically developing children. The CSLI children tended to produce more verbal syntactic utterances than their TD-MLU peers, but only limited to their verbal syntactic utterances with function verbs. On the other hand, the CSLI group tended to use a less diverse set of verbs than their TD-MLU peers when building up verbal syntactic utterances, which could be due to a more restricted verb lexicon. Regarding the use of verbal suffixes in their verbal syntactic utterances, the CSLI children used number of verb forms for verb types modified by suffixes in similar ratio as the TD-MLU controls. However, a firm conclusion on any possible differences between the two groups of children's use of verbal suffixes cannot be reached in light of the low frequency of occurrence in their language samples.

Future Directions

In studies of grammatical or syntactic development, large sample size in terms of both number of subjects and length of samples was preferred. Even a 100-utterance samples may not be adequate for grammatical analysis (Balason & Dollaghan, 2002). Since the measure of UST was found to be correlated with MLU in early word combination stages, sample length could be controlled using USTs, say 100 UST utterances for grammatical or syntactic analysis. More reliable group differences may arise for the verb diversity measure used in this study if longer corpus length and more subjects were available. Elicitation procedures supplementary to spontaneous language samples were suggested as a rule rather than the exception for the study of grammatical morphemes in English, where grammatical morphemes are obligatory (Balason & Dollaghan, 2002). In Cantonese, where bound morphemes are non-obligatory, elicited data will be even more important and informative for the study of bound forms, such as suffixes.

In this study, preliminary evidence for CSLI's vulnerability in verb-phrase-structure expansion was reviewed in their heavier reliance on function verbs in building syntactic utterances. Further studies on verb argument and phrases structure used by CSLI children are suggested, focusing on the extent and impact of lexical and morphological difficulties identified so far on early syntactic development of these children.

Acknowledgements

I would like to express my gratitude to Dr. Anita Wong, my dissertation supervisor, for her valuable advice and comments, and continuous support on this study. Thanks are also due to Professor Paul Fletcher for his co-supervision of this study and guidance in the initial stage. My special appreciation is expressed to Miss Eva Chau for performing reliability check and providing helpful advice. Finally, I would like to thank Mr. Donald Tam for his contributions and unconditional supports throughout the year.

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